

CLAIMS

Claims 1-5 Previously cancelled without prejudice or disclaimer.

6. (Original) An algorithm for use by a digital image reader/decoder, comprising the steps:

- (i) acquire an image at an initial frame rate parameter, gain parameter, and exposure time parameter,
- (ii) evaluate the image,
- (iii) determine whether the system is operating at a fastest frame rate, and, if not,
- (iv) calculate a new exposure time parameter to provide a desired image illumination,
- (v) calculate a maximum frame rate parameter that will support the new exposure time,
- (vi) calculate a new exposure setting parameter that will support the new exposure time at the maximum frame rate,
- (vii) determine whether the image is acceptable and, if yes,
- (viii) output and decode the image, and provide the parameters in (iv-vi) to the imager as new initial parameters, and
- (ix) return to (i).

7. (Original) An algorithm for use by a digital image reader/decoder, comprising the steps:

- (i) acquire the image,
- (ii) evaluate the image,
- (iii) determine whether the system is operating at a fastest frame rate, and, if not,
- (iv) calculate a new exposure time parameter to provide a desired image illumination,
- (v) calculate a maximum frame rate parameter that will support the new exposure time,
- (vi) calculate a new exposure setting parameter that will support the new exposure time at the maximum frame rate,

- (vii) determine whether the image is acceptable and, if not,
- (viii) provide the parameters in (iv-vi) to the imager as new initial parameters, and
- (ix) return to (i).

8. (Previously Presented) An algorithm for use by a digital image reader/decoder, comprising the steps:

- (i) acquire the image,
- (ii) evaluate the image,
- (iii) determine whether the system is operating at a fastest frame rate, and, if yes,
- (iv) determine an illumination level of the image and whether the image was acquired at a maximum exposure setting and a maximum gain setting and, if no,
- (v) calculate a new exposure parameter and a new gain parameter that are, at most, maximum respective values for the initial frame rate, which produce a desired image illumination,
- (vi) determine whether the image is acceptable and, if not,
- (vii) provide the parameters in (iv-vi) to the imager as new initial parameters, and
- (viii) return to (i).

9. (Previously Presented) An algorithm for use by a digital image reader/decoder, comprising the steps:

- (i) acquire the image,
- (ii) evaluate the image,
- (iii) determine whether the system is operating at a fastest frame rate, and, if yes,
- (iv) determine an illumination level of the image and whether the image was acquired at a maximum exposure setting and a maximum gain setting and, if no,
- (v) calculate a new exposure parameter and a new gain parameter that are, at most, maximum respective values for the initial frame rate, which produce a desired image illumination,
- (vi) determine whether the image is acceptable and, if yes,
- (vii) output and decode the image, and provide the parameters in (iv-vi) to the imager as new initial parameters, and

(viii) return to (i).

10. (Original) An algorithm for use by a digital image reader/decoder, comprising the steps:

- (i) acquire the image,
- (ii) evaluate the image,
- (iii) determine whether the system is operating at a fastest frame rate, and, if yes,
- (iv) determine an illumination level of the image and whether the image was acquired at a maximum exposure setting and a maximum gain setting and, if yes,
- (v) calculate a new exposure time parameter that will provide a desired image illumination,
- (vi) calculate a maximum frame rate parameter that will support the new exposure time parameter,
- (vii) calculate a new exposure setting parameter that will support the new exposure time at the maximum frame rate,
- (viii) determine whether the image is acceptable and, if yes,
- (ix) output and decode the image, and provide the parameters in (v-vii) to the imager as new initial parameters, and
- (x) return to (i).

11. (Original) An algorithm for use by a digital image reader/decoder, comprising the steps:

- (i) acquire the image,
- (ii) evaluate the image,
- (iii) determine whether the system is operating at a fastest frame rate, and, if yes,
- (iv) determine an illumination level of the image and whether the image was acquired at a maximum exposure setting and a maximum gain setting and, if yes,
- (v) calculate a new exposure time parameter that will provide a desired image illumination,
- (vi) calculate a maximum frame rate parameter that will support the new exposure time parameter,

- (vii) calculate a new exposure setting parameter that will support the new exposure time at the maximum frame rate,
- (viii) determine whether the image is acceptable and, if yes,
- (ix) output and decode the image, and provide the parameters in (v-vii) to the imager as new initial parameters, and
- (x) return to (i).

Claims 12-47 Previously cancelled without prejudice or disclaimer.

48. (Currently Amended) A digital image reading system, comprising:

- a) an image sensing component adapted to acquire an image at an initial frame rate parameter, gain parameter, and exposure time parameter; and
- b) a computer coupled to the image sensing component, wherein the computer is programmed to adjust the frame rate such that the image sensing component can operate at a maximum frame rate to capture an acceptable image, wherein the computer is programmed to:
 - (i) acquire the image,
 - (ii) evaluate the image[L]
 - (iii) determine whether the system is operating at a fastest frame rate, and, if not,
 - (iv) calculate a new exposure time parameter to provide a desired image illumination,
 - (v) calculate a maximum frame rate parameter that will support the new exposure time,
 - (vi) calculate a new exposure setting parameter that will support the new exposure time at the maximum frame rate,
 - (vii) determine whether the image is acceptable and, if yes,
 - (viii) output and decode the image, and provide the parameters in (iv-vi) to the imager as new initial parameters, and
 - (ix) return to (i).

49. (Currently Amended) A digital image reading system, comprising:
- a) an image sensing component adapted to acquire an image at an initial frame rate parameter, gain parameter, and exposure time parameter; and
 - b) a computer coupled to the image sensing component, wherein the computer is programmed to adjust the frame rate such that the image sensing component can operate at a maximum frame rate to capture an acceptable image, wherein the computer is programmed to:
 - (i) acquire the image,
 - (ii) evaluate the image[.]]
 - (iii) determine whether the system is operating at a fastest frame rate, and, if not,
 - (iv) calculate a new exposure time parameter to provide a desired image illumination,
 - (v) calculate a maximum frame rate parameter that will support the new exposure time,
 - (vi) calculate a new exposure setting parameter that will support the new exposure time at the maximum frame rate,
 - (vii) determine whether the image is acceptable, and if not,
 - (viii) provide the parameters in (iv-vi) to the imager as new initial parameters, and
 - (ix) return to (i).
50. (Currently Amended) A digital image reading system, comprising:
- a) an image sensing component adapted to acquire an image at an initial frame rate parameter, gain parameter, and exposure time parameter; and
 - b) a computer coupled to the image sensing component, wherein the computer is programmed to adjust the frame rate such that the image sensing component can operate at a maximum frame rate to capture an acceptable image, wherein the computer is programmed to:
 - (i) acquire the image,
 - (ii) evaluate the image[.]]

(iii) determine whether the system is operating at a fastest frame rate, and, if yes,

(iv) determine an illumination level of the image and whether the image was acquired at a maximum exposure setting and a maximum gain setting, and, if no,

(v) calculate a new exposure parameter and a new gain parameter that are, at most, maximum respective values for the initial frame rate, which produce a desired image illumination,

(vi) determine whether the image is acceptable and, if not,

(vii) provide the parameters in (iv-vi) to the imager as new initial parameters, and

(viii) return to (i).

51. (Previously Presented) A digital image reading system, comprising:

a) an image sensing component adapted to acquire an image at an initial frame rate parameter, gain parameter, and exposure time parameter; and

b) a computer coupled to the image sensing component, wherein the computer is programmed to adjust the frame rate such that the image sensing component can operate at a maximum frame rate to capture an acceptable image, wherein the computer is programmed to:

(i) acquire the image,

(ii) evaluate the image,

(iii) determine whether the system is operating at a fastest frame rate, and, if yes,

(iv) determine an illumination level of the image and whether the image was acquired at a maximum exposure setting and a maximum gain setting, and, if no,

(v) calculate a new exposure parameter and a new gain parameter that are, at most, maximum respective values for the initial frame rate, which produce a desired image illumination,

(vi) determine whether the image is acceptable and, if yes,

(vii) output and decode the image, and provide the parameters in (iv-vi) to the imager as new initial parameters, and
(viii) return to (i).

52. (Previously Presented) A digital image reading system, comprising:

a) an image sensing component adapted to acquire an image at an initial frame rate parameter, gain parameter, and exposure time parameter; and

b) a computer coupled to the image sensing component, wherein the computer is programmed to adjust the frame rate such that the image sensing component can operate at a maximum frame rate to capture an acceptable image, wherein the computer is programmed to:

(i) acquire the image,

(ii) evaluate the image,

(iii) determine whether the system is operating at a fastest frame rate, and, if yes,

(iv) determine an illumination level of the image and whether the image was acquired at a maximum exposure setting and a maximum gain setting, and, if yes,

(v) calculate a new exposure time parameter that will provide a desired image illumination,

(vi) calculate a maximum frame rate parameter that will support the new exposure time parameter,

(vii) calculate a new exposure setting parameter that will support the new exposure time at the maximum frame rate,

(viii) determine whether the image is acceptable and, if yes,

(ix) output and decode the image, and provide the parameters in (v-vii) to the imager as new initial parameters, and

(x) return to (i).

53. (Previously Presented) A digital image reading system, comprising:
- a) an image sensing component adapted to acquire an image at an initial frame rate parameter, gain parameter, and exposure time parameter; and
 - b) a computer coupled to the image sensing component, wherein the computer is programmed to adjust the frame rate such that the image sensing component can operate at a maximum frame rate to capture an acceptable image, wherein the computer is programmed to:
 - (i) acquire the image,
 - (ii) evaluate the image,
 - (iii) determine whether the system is operating at a fastest frame rate, and, if yes,
 - (iv) determine an illumination level of the image and whether the image was acquired at a maximum exposure setting and a maximum gain setting, and, if yes,
 - (v) calculate a new exposure time parameter that will provide a desired image illumination,
 - (vi) calculate a maximum frame rate parameter that will support the new exposure time parameter,
 - (vii) calculate a new exposure setting parameter that will support the new exposure time at the maximum frame rate,
 - (viii) determine whether the image is acceptable and, if yes,
 - (ix) output and decode the image, and provide the parameters in (v-vii) to the imager as new initial parameters, and
 - (x) return to (i).
54. (Previously Presented) A digital image reading system, comprising:
- a) an image reading component including a digitizer; and
 - b) an image decoding component,
- wherein the image reading component includes a plurality of digitizers, and wherein each of the plurality of digitizers is configured to operate over a respective

parameter range of a given parameter associated with the plurality of digitizers, and further wherein each parameter range is different from any other parameter range.

55. (Previously Presented) The digital image reading system of claim 54, wherein the given parameter is a reading distance.

56. (Previously Presented) The digital image reading system of claim 54, wherein the given parameter is a symbology black/white contrast.

57. (Previously Presented) The digital image reading system of claim 54, wherein the given parameter is a symbology color contrast.

58. (Previously Presented) The digital image reading system of claim 54, wherein the given parameter is a motion blur.

59. (Previously Presented) The digital image reading system of claim 54, wherein the given parameter is a bar growth.

60. (Previously Presented) The digital image reading system of claim 54, comprising three digitizers configured to operate over a close reading range, a medium reading range, and a far reading range.

61. (Previously Presented) The digital image reading system of claim 60, wherein at least two of the parameter ranges overlap.

62. (Previously Presented) A process for obtaining an acceptable image, comprising:
providing a digital image reader having a plurality of digitizers;
making an image acquisition attempt utilizing one of the plurality of digitizers; and
making a subsequent image acquisition attempt utilizing a different one of the plurality of digitizers, wherein the plurality of digitizers are configured for operation over a respective parameter range of a given parameter associated with the plurality of

digitizers, further wherein each parameter range is different from any other parameter range.

63. (Previously Presented) A bar code reading device comprising:
an image sensor including a plurality of photosensitive elements;
a lens assembly focusing an image onto said image sensor;
a trigger;
a housing encapsulating said image sensor;
a control circuit in communication with said image sensor wherein said device is configured so that said device captures image data in response to actuation of said trigger; and

a plurality of digitizers, wherein each of the plurality of digitizers is configured to operate over a respective parameter range of a given parameter associated with the plurality of digitizers, and further wherein each parameter range is different from any other parameter range.

64. (Previously Presented) The bar code reading device of claim 63, wherein the given parameter is a reading distance.

65. (Previously Presented) The bar code reading device of claim 63, wherein the given parameter is a symbology black/white contrast.

66. (Previously Presented) The bar code reading device of claim 63, wherein the given parameter is a symbology color contrast.

67. (Previously Presented) The bar code reading device of claim 63, wherein the given parameter is a motion blur.

68. (Previously Presented) The bar code reading device of claim 63, wherein the given parameter is a bar growth.

69. (Previously Presented) The bar code reading device of claim 63, comprising three digitizers configured to operate over a close reading range, a medium reading range, and a far reading range.
70. (Previously Presented) The bar code reading device of claim 63, wherein at least two of the parameter ranges overlap.
71. (Previously Presented) The bar code reading device of claim 63, wherein each of said plurality of digitizers is a software module executable by said control circuit.
72. (Previously Presented) The bar code reading device of claim 63, wherein said image sensor is a two dimensional image sensor comprising a plurality of pixels formed in a plurality of rows and columns of pixels.
73. (Previously Presented) The bar code reading device of claim 72, wherein the given parameter is a reading distance.
74. (Previously Presented) The bar code reading device of claim 72, wherein the given parameter is a symbology black/white contrast.
75. (Previously Presented) The bar code reading device of claim 72, wherein the given parameter is a symbology color contrast.
76. (Previously Presented) The bar code reading device of claim 72, wherein the given parameter is a motion blur.
77. (Previously Presented) The bar code reading device of claim 72, wherein the given parameter is a bar growth.

78. (Previously Presented) The bar code reading device of claim 72, comprising three digitizers configured to operate over a close reading range, a medium reading range, and a far reading range.

79. (Previously Presented) The bar code reading device of claim 78, wherein at least two of the parameter ranges overlap.

80. (Previously Presented) The bar code reading device of claim 72, wherein each of said plurality of digitizers is a software module executable by said control circuit.

81. (Previously Presented) The bar code reading device of claim 63, wherein said plurality of digitizers are configured to run in parallel.

82. (Previously Presented) The bar code reading device of claim 63, wherein said plurality of digitizers are configured to run in series.

83. (Previously Presented) The bar code reading device of claim 72, wherein said plurality of digitizers are configured to run in parallel.

84. (Previously Presented) The bar code reading device of claim 72, wherein said plurality of digitizers are configured to run in series.